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EXAMINER	
STELLING, LUCAS A	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/589,331	YOSHIDA, HIROYUKI	
	Examiner	Art Unit	
	Lucas Stelling	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 August 2006*.

2a)☐ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☒ Claim(s) *14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8-14-06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 14 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper form. This claim appears to be the product of a translation error. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 1, 9 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by JP Publication No. 2002-226871 to Hitoshi ("Hitoshi").

4. As to claim 1, Hitoshi teaches a method of producing sub-critical water decomposition products, comprising:

continuously **([0016], the material is continuously supplied to the reactor)** supplying material to be processed into a reactor through an inlet provided for the reactor, whose interior is kept at a sub-critical condition for water **([0014], and see instant application at page 13 paragraph [0026])**; and

continuously **([0025] and [0026])** taking out a liquid containing a decomposition product through one or a plurality of outlets provided at a different position from the

position where the inlet of the reactor is provided, to adjust residence time of the liquid containing the decomposition product in the reactor.

5. As to claim 9, the temperature and pressure are within the ranges contemplated by applicant **([0014] and see instant application at page 13 paragraph [0026])**.

6. As to claim 10, the material to be processed is plastic **([0001])**.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 2, 23 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hitoshi in view of U.S. Patent No. 3,647,681 to Egan ("Egan").

10. As to claim 2, Hitoshi teaches a method of producing sub-critical water decomposition products, comprising:

continuously supplying material**(Hitoshi [0016], the material is continuously supplied to the reactor)** to be processed into a reactor through an inlet provided for

the reactor, whose interior is kept at a sub-critical condition for water**([0014], and see instant application at page 13 paragraph [0026])**;

continuously taking out a liquid containing a decomposition product through one **(Hitoshi [0025] and [0026])** or a plurality of outlets provided.

11. Hitoshi is different from claim 2 in that multiple or adjustable outlets for removing the decomposition products are not taught. The use of multiple outlets in a chemical reactor is known as fractionating: an example of which is shown in Egan **(Egan See Fig. 1, and col. 4 lines 10-45)**. Fractionating allows for the selective removal of specific types of reaction products from a column. It is also worth noting that Hiroshi recognizes that different decomposition products are created and the need to draw them off **(Hitoshi [0022])**. Under Rationale D of *KSR v. Teleflex*, using a fractionation in a sub-critical water oxidation column constitutes applying a known technique **(fractionating)** to a known method **(sub-critical water oxidation as shown in Hitoshi)** ready for improvement to yield predictable results **(the known result of fractionating is that selected components from the reaction column can be drawn off during processing)**. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to provide for multiple outlets on the reactor of Hitoshi in order to use fractionating to remove selected decomposition products. See MPEP 2143(D).

12. As to claim 23, the temperature and pressure are within the ranges contemplated by applicant **(Hitoshi [0014] and see instant application at page 13 paragraph [0026])**.

13. As to claim 26, the material to be processed is plastic **(Hitoshi [0001])**.

14. Claim 3-8, 24, 25, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0113024 to Pilz et al. ("Pilz") in view of Egan.

15.

16. As to claim 3, Pilz teaches a method of producing sub-critical water decomposition products comprising:

continuously supplying material to be processed **(Pilz [0050])** that contains solid matter having a slow decomposition rate with sub-critical water and a different specific gravity from that of the sub-critical water, into a vertical-type reactor whose interior is kept at sub-critical conditions for water, through an inlet provided for the reactor;

forming in the steady flow, in the following order from the upstream of the flow, at least a fluidized bed **(Pilz [0051])** in which the solid matter is decomposed into fine particles by the sub-critical water and the fine particles fluidize in the flow, and a sub-critical water dissolution part in which the material to be processed is turned into further finer particles or completely turned into a soluble material to flow with the sub-critical water;

17. further forming depending on the type of the material to be processed, a fixed bed **(a fixed bed portion can be formed based on the material decomposed, see also [0045] where Pilz recognizes sedimentation)** in which solid matter stays in a fixed location even with the flow, the fixed bed formed upstream of the fluidized bed.

18. Pilz is different from claim 3 in that multiple or adjustable outlets for removing the decomposition products are not taught.

19. As to the multiple outlets, the use of multiple outlets in a chemical reactor is known as fractionating: an example of which is shown in Egan **(Egan See Fig. 1, and col. 4 lines 10-45)**. Fractionating allows for the selective removal of specific types of reaction products from a column. It is also worth noting that Hiroshi recognizes that different decomposition products are created and the need to draw them off **(Hitoshi [0022])**. Under Rationale D of *KSR v. Teleflex*, using a fractionation in a sub-critical water oxidation column constitutes applying a known technique **(fractionating)** to a known method **(sub-critical water oxidation as shown in Hitoshi)** ready for improvement to yield predictable results **(the known result of fractionating is that selected components from the reaction column can be drawn off during processing)**. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to provide for multiple outlets on the reactor of Hitoshi in order to use fractionating to remove selected decomposition products. See MPEP 2143(D).

20. As to claim 24, the temperature and pressure are within the ranges contemplated by applicant **(Pilz [0067])**.

21. As to claim 27, the material to be processed is auto manufacture waste **(Pilz [0050])**.

22. As to claim 4 Pilz teaches a method of producing sub-critical water decomposition products, comprising:

23. causing a mixture of material to be processed containing a solid matter and sub-critical water to flow in sub-critical water in a steady state in an opposite direction to the direction in which the solid matter flows **(Pilz [0067] , [0050] and [0008])**;

24. forming in the flow, in the following order from the upstream of the flow, at least a fluidized bed **(Pilz [0051])** in which the solid matter is decomposed into fine particles by the sub-critical water and the fine particles fluidize in the flow, and a sub-critical water dissolution part in which the material to be processed is turned into further finer particles or completely turned into a soluble material to flow with the sub-critical water; further forming **(a fixed bed portion can be formed based on the material decomposed see also [0045] where Pilz recognizes sedimentation)**, depending on the type of the material to be processed, a fixed bed in which solid matter stays in a fixed location even with the flow, the fixed bed formed upstream of the fluidized bed.

25. Pilz is different from claim 4 in that multiple or adjustable outlets for removing the decomposition products are not taught. The use of multiple outlets in a chemical reactor is known as fractionating: an example of which is shown in Egan **(Egan See Fig. 1, and col. 4 lines 10-45)**. Fractionating allows for the selective removal of specific types of reaction products from a column. Under Rationale D of *KSR v. Teleflex*, using a fractionation in a sub-critical water oxidation column constitutes applying a known technique **(fractionating)** to a known method **(sub-critical water oxidation as shown in Hitoshi)** ready for improvement to yield predictable results **(the**

known result of fractionating is that selected components from the reaction column can be drawn off during processing). Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to provide for multiple outlets on the reactor of Pilz in order to use fractionating to remove selected decomposition products. See MPEP 2143(D).

26. As to claim 5, Pilz teaches that sedimentation occurs **([0045])**.

27. As to claims 6 and 7, Pilz teaches that the sold matter floats about in the mixture, and at least partially follows the direction of gravitation force **(See Fig. 5, line 34, slurry comes in inlet 22 and goes down for a bit, before floating back up to exit through port 24)**.

28. As to claim 8, Pilz teaches that the mixture is a slurry of waste materials suspended in water **([0050])**.

29. As to claims 25 and 28, Pilz teaches that the reaction is sub-critical **([0067])**, and that the material to be treated is electronics or automobile recycling waste, which would have some plastics, rubber, and fiber in them **([0050])**.

30. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hitoshi in view of Egan

31. As to claim 11, Hitoshi teaches an apparatus for sub-critical water decomposition treatment, comprising:

a reactor **(Hitoshi 1)** configured to decompose material to be processed using sub-critical water;

heating means **(Hitoshi 13)**for heating a mixture composed of water and the to be processed material to form and keep sub-critical conditions for water; and compressing means **(Hitoshi 13, heating means also prepares the specified pressure, see [0024])** for compressing the mixture;

introducing means **(Hitoshi [0024] teaches a feeding means)** for introducing the material to be processed into the reactor;

and inlet **(Hitoshi [0024] the slurry from the pump 12, is fed via the warmer 13 to the tank, which would have an inlet to accommodate the slurry intake)** for introducing the material to be processed to the reactor;

and outlet **(the outlet leads to the pressure regulating valve 21)** for letting out a mixture of a decomposition product and water from the reactor.

32. Hitoshi is different from claim 11, in that in multiple or adjustable outlets for removing the decomposition products are not taught. The use of multiple outlets in a chemical reactor is known as fractionating: an example of which is shown in Egan **(Egan See Fig. 1, and col. 4 lines 10-45)**. Fractionating allows for the selective removal of specific types of reaction products from a column. Under Rationale D of *KSR v. Teleflex*, using a fractionation in a sub-critical water oxidation column constitutes applying a known technique **(fractionating)** to a known method **(sub-critical water oxidation as shown in Hitoshi)** ready for improvement to yield predictable results **(the known result of fractionating is that selected components from the reaction column can be drawn off during processing)**. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to provide for multiple

outlets on the reactor of Hitoshi in order to use fractionating to remove selected decomposition products. See MPEP 2143(D).

33. Claim 12-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pilz in view of Egan and Hitoshi.

34. As to claim 12, Pilz teaches an apparatus for sub-critical water decomposition treatment comprising:

a vertical-type reactor **(Pilz see Fig. 5)** configured to decompose material to be processed with sub-critical water **(Pilz [0067])**;

introducing means **(Pilz [0050], sluice or lock with a shredder reads on the introducing means)** for introducing the material to be processed into the reactor;

an inlet **(Pilz 22, Fig. 5, and [0048] and [0050])** for introducing the material to be processed in into the reactor; and

an outlet **(Pilz 6 and 24, Fig. 5)** for out for letting out a mixture of water and a decomposition product from the reactor, characterized in that:

the reactor is arranged substantially vertically **(See Fig. 5, and [0047])**;

the inlet is provided for at least one of a top end portion or a bottom end portion of the reactor **(See Fig. 5, the inlet is provided at the upper portion of the reactor)**; and

35. the introduced mixture of the material to be processed and the sub-critical water is caused to flow, in the sub-critical water in a steady state, in an opposite direction to the direction in which the solid matter travels, so as to form in the flow, in the flowing

order from the upstream of the flow, at least a fluidized bed in which the solid matter is decomposed into fine particles with the sub-critical water and the fine particles fluidized in the flow, and a sub-critical water dissolution part in which the material to be processed is turned into further finer particles or completely into a soluble material to flow with the subcritical water, and to further form, depending on the material to be processed, a fixed bed in which solid matter stays in a fixed position even with the flow, the fixed bed being formed upstream of the fluidized bed **(Pilz is a fluidized bed reactor that can be operated in a sub-critical manner, and is fully capable of this operation)**.

36. Pilz is different from claim 12 in that multiple or adjustable outlets for removing the decomposition products are not taught, and a heating and pressurizing means is not taught at the inlet.

37. As to the heating and pressurizing means, Hitoshi teaches the use of warmer to bring the incoming slurry to the correct pressure and temperature for processing **(Hitoshi [0024])**. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to include a heater and pressurizer for the incoming slurry to ensure that it is at the correct pressure and temperature for sub-critical processing.

38. As to the use of multiple outlets, the use of multiple outlets in a chemical reactor is known as fractionating: an example of which is shown in Egan **(Egan See Fig. 1, and col. 4 lines 10-45)**. Fractionating allows for the selective removal of specific types of reaction products from a column. Under Rationale D of *KSR v. Teleflex*, using a fractionation in a sub-critical water oxidation column constitutes applying a known

technique **(fractionating)** to a known method **(sub-critical water oxidation as shown in Hitoshi)** ready for improvement to yield predictable results **(the known result of fractionating is that selected components from the reaction column can be drawn off during processing)**. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to provide for multiple outlets on the reactor of Pilz in order to use fractionating to remove selected decomposition products. See MPEP 2143(D).

39. As to claim 13, the fractionator of Egan contains multiple outlets for the different fractions **(See Egan in the Figure)**.

40. As to claim 14, there do not appear to be any further patentable limitations as currently drafted.

41. As to claim 15, monitoring means are known in the art, and it is common and within the skill and knowledge of one of ordinary skill in the art to provide such means to monitor the environment inside a chemical reactor. Therefore it would have been obvious to a person of ordinary skill in the art to provide monitoring means in the apparatus of Pilz, Hitoshi and Egan.

42. As to claim 16, the inlet orifice size will control the amount and speed at which material to be processed enters the reaction chamber. The size of the chamber determines the operating capacity of the reactor and its throughput. It is within the understanding of a person of ordinary skill in the art that the size of the inlet must be sufficient to supply the reactor with adequate reactants without overloading it. Therefore, the relative dimensions of the inlet and outlet of the apparatus would have

been obvious to a person of ordinary skill in the art as the product of routine experimentation.

43. As to claim 17, use of plural reactors in serious or parallel would be an obvious duplication of parts. See MPEP 2144.04(VI)(B).

44. As to claim 18, the inlet orifice size will control the amount and speed at which material to be processed enters the reaction chamber. The size of the chamber determines the operating capacity of the reactor and its throughput. It is within the understanding of a person of ordinary skill in the art that the size of the inlet must be sufficient to supply the reactor with adequate reactants without overloading it. Therefore, the relative dimensions of the inlet and outlet of the apparatus would have been obvious to a person of ordinary skill in the art as the product of routine experimentation.

45. Also, for claim 18, the use of a secondary reactor joined to the outlet of the first reactor is shown in Hitoshi **(Hitoshi [0023]-[0025])**. The use of such a reactor allows for further chemical processing of the degradation products of the sub-critical water oxidation. Therefore, the use of a secondary reactor would have been obvious to a person of ordinary skill in the art at the time of invention in order to further chemically process the degradation products of sub-critical water oxidation.

46. As to claim 19, the use of a secondary reactor joined to the outlet of the first reactor is shown in Hitoshi **(Hitoshi [0023]-[0025])**. The use of such a reactor allows for further chemical processing of the degradation products of the sub-critical water oxidation. Therefore, the use of a secondary would have been obvious to a person of

ordinary skill in the art at the time of invention in order to further chemically process the degradation products of sub-critical water oxidation. Furthermore, multiple reactors in series or parallel can be used to carry out more complicated downstream chemical treatment of the degradation products. See also MPEP 2144.04(B).

47. As to claim 20, Hitoshi teaches the use of a heating means between the first and second reactors **(Hitoshi 22, [0027])**. It is within the understanding of a person of ordinary skill in the art to use a heating or cooling means in order to adjust the temperature of the degradation products to the ideal temperature for the next chemical reaction. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to provide for a heating or cooling means before the second reactor.

48. As to claim 21, Hitoshi teaches the use of a pressure regulating valve provided in the outlet of the sub-critical water oxidation reactor **(Hitoshi [0021])**. It is within the skill and understanding of a person of ordinary skill in the art to use a back-pressure, or pressure regulating valve in a pressurized reactor to prevent over pressurization. Therefore, it would have been obvious to a person of ordinary skill in the art to provide a back-pressure valve on the reactor, and to control the reactor pressure with it in order to prevent over pressurization.

49. As to claim 22, Pilz teaches the use of a heat exchanger and pressure reducing valve in series **(Pilz 16 and 18, and [0047])**. It is within the understanding of a person of ordinary skill in the art to use a heat exchanger and pressure regulating valve in series after products exit a reactor in order to both control the pressure in the reactor

and to adjust the temperature and pressure of the products to the ideal temperature for another chemical reaction or disposal. Therefore it would have been obvious to a person of ordinary skill in the art at the time of invention to provide a cooling pipe before the back-pressure valve in order to adjust the degradation products to the ideal temperature and pressure for another chemical reaction or disposal.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lucas Stelling whose telephone number is (571)270-3725. The examiner can normally be reached on Monday through Thursday 12:00PM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

las 10-27-08

/Duane S. Smith/
Supervisory Patent Examiner, Art Unit 1797